SEQUENCE LISTING

<110> Sakaki Yoshiyuki
       Tei, Hajime

<120> Mammalian Genes Involved in Circadian Periods

<130> SPO-108

<140> US 09/508,342

<141> 2000-03-10

<150> JP 9/267846

<151> 1997-09-12

<160> 4

<210> 1
<211> 1290
<212> PRT
<213> Homo sapiens

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Met Ser Gly Pro Leu Glu Gly Ala Asp Gly Gly Gly Asp Pro Arg Pro
1   5   10   15

Gly Glu Ser Phe Cys Pro Gly Gly Val Pro Ser Pro Gly Pro Pro Gln
                20   25   30

His Arg Pro Cys Pro Gly Pro Ser Leu Ala Asp Asp Thr Asp Ala Asn
            35   40   45

Ser Asn Gly Ser Ser Gly Asn Glu Ser Asn Gly His Glu Ser Arg Gly
        50   55   60

Ala Ser Gln Arg Ser Ser His Ser Ser Ser Ser Gly Asn Gly Lys Asp
65   70   75   80

Ser Ala Leu Leu Glu Thr Thr Glu Ser Ser Lys Ser Thr Asn Ser Gln
                85   90   95

Ser Pro Ser Pro Pro Ser Ser Ser Ile Ala Tyr Ser Leu Leu Ser Ala
            100   105   110

Ser Ser Glu Gln Asp Asn Pro Ser Thr Ser Gly Cys Ser Ser Glu Gln
            115   120   125

Ser Ala Arg Ala Arg Thr Gln Lys Glu Leu Met Thr Ala Leu Arg Glu
        130   135   140

Leu Lys Leu Arg Leu Pro Pro Glu Arg Arg Gly Lys Gly Arg Ser Gly
145   150   155   160

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Thr Leu Ala Thr Leu Gln Tyr Ala Leu Ala Cys Val Lys Gln Val Gln
                165                 170                 175

Ala Asn Gln Glu Tyr Tyr Gln Gln Trp Ser Leu Glu Glu Gly Glu Pro
                180                 185                 190

Cys Ser Met Asp Met Ser Thr Tyr Thr Leu Glu Glu Leu Glu His Ile
                195                 200                 205

Thr Ser Glu Tyr Thr Leu Gln Asn Gln Asp Thr Phe Ser Val Ala Val
    210                 215                 220

Ser Phe Leu Thr Gly Arg Ile Val Tyr Ile Ser Glu Gln Ala Ala Val
225                 230                 235                 240

Leu Leu Arg Cys Lys Arg Asp Val Phe Arg Gly Thr Arg Phe Ser Glu
                245                 250                 255

Leu Leu Ala Pro Gln Asp Val Gly Val Phe Tyr Gly Ser Thr Ala Pro
                260                 265                 270

Ser Arg Leu Pro Thr Trp Gly Thr Gly Ala Ser Ala Gly Ser Gly Leu
                275                 280                 285

Arg Asp Phe Thr Gln Glu Lys Ser Val Phe Cys Arg Ile Arg Gly Gly
                290                 295                 300

Pro Asp Arg Asp Pro Gly Pro Arg Tyr Gln Pro Phe Arg Leu Thr Pro
305                 310                 315                 320

Tyr Val Thr Lys Ile Arg Val Ser Asp Gly Ala Pro Ala Gln Pro Cys
                325                 330                 335

Cys Leu Leu Ile Ala Glu Arg Ile His Ser Gly Tyr Glu Ala Pro Arg
                340                 345                 350

Ile Pro Pro Asp Lys Arg Ile Phe Thr Thr Arg His Thr Pro Ser Cys
                355                 360                 365

Leu Phe Gln Asp Val Asp Glu Arg Ala Ala Pro Leu Leu Gly Tyr Leu
    370                 375                 380

Pro Gln Asp Leu Leu Gly Ala Pro Val Leu Leu Phe Leu His Pro Glu
385                 390                 395                 400

Asp Arg Pro Leu Met Leu Ala Ile His Lys Lys Ile Leu Gln Leu Ala
                405                 410                 415

Gly Gln Pro Phe Asp His Ser Pro Ile Arg Phe Cys Ala Arg Asn Gly
                420                 425                 430

Glu Tyr Val Thr Met Asp Thr Ser Trp Ala Gly Phe Val His Pro Trp
                435                 440                 445

Ser Arg Lys Val Ala Phe Val Leu Gly Arg His Lys Val Arg Thr Ala
    450                 455                 460
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Pro Leu Asn Glu Asp Val Phe Thr Pro Pro Ala Pro Ser Pro Ala Pro
465             470             475             480

Ser Leu Asp Thr Asp Ile Gln Glu Leu Ser Glu Gln Ile His Arg Leu
                485             490             495

Leu Leu Gln Pro Val His Ser Pro Ser Pro Thr Gly Leu Cys Gly Val
            500             505             510

Gly Ala Val Thr Ser Pro Gly Pro Leu His Ser Pro Gly Ser Ser Ser
            515             520             525

Asp Ser Asn Gly Gly Asp Ala Glu Gly Pro Gly Pro Pro Ala Pro Val
        530             535             540

Thr Phe Gln Gln Ile Cys Lys Asp Val His Leu Val Lys His Gln Gly
545             550             555             560

Gln Gln Leu Phe Ile Glu Ser Arg Ala Arg Pro Gln Ser Arg Pro Arg
            565             570             575

Leu Pro Ala Thr Gly Thr Phe Lys Ala Lys Ala Leu Pro Cys Gln Ser
            580             585             590

Pro Asp Pro Glu Leu Glu Ala Gly Ser Ala Pro Val Gln Ala Pro Leu
        595             600             605

Ala Leu Val Pro Glu Glu Ala Glu Arg Lys Glu Ala Ser Ser Cys Ser
    610             615             620

Tyr Gln Gln Ile Asn Cys Leu Asp Ser Ile Leu Arg Tyr Leu Glu Ser
625             630             635             640

Cys Asn Leu Pro Ser Thr Thr Lys Arg Lys Cys Ala Ser Ser Ser Ser
            645             650             655

Tyr Thr Thr Ser Ser Ala Ser Asp Asp Asp Arg Gln Arg Thr Gly Pro
            660             665             670

Val Ser Val Gly Thr Lys Lys Asp Pro Pro Ser Ala Ala Leu Ser Gly
            675             680             685

Glu Gly Ala Thr Pro Arg Lys Glu Pro Val Val Gly Gly Thr Leu Ser
    690             695             700

Pro Leu Ala Leu Ala Asn Lys Ala Glu Ser Val Val Ser Val Thr Ser
705             710             715             720

Gln Cys Ser Phe Ser Ser Thr Ile Val His Val Gly Asp Lys Lys Pro
            725             730             735

Pro Glu Ser Asp Ile Ile Met Met Glu Asp Leu Pro Gly Leu Ala Pro
            740             745             750

Gly Pro Ala Pro Ser Pro Ala Pro Ser Pro Thr Val Ala Pro Asp Pro
            755             760             765
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Ala Pro Asp Ala Tyr Arg Pro Val Gly Leu Thr Lys Ala Val Leu Ser
    770                 775                 780

Leu His Thr Gln Lys Glu Glu Gln Ala Phe Leu Ser Arg Phe Arg Asp
785                 790                 795                 800

Leu Gly Arg Leu Arg Gly Leu Asp Ser Ser Ser Thr Ala Pro Ser Ala
                805             810                 815

Leu Gly Glu Arg Gly Cys His His Gly Pro Ala Pro Pro Ser Arg Arg
            820             825             830

His His Cys Arg Ser Lys Ala Lys Arg Ser Arg His His Gln Asn Pro
        835             840             845

Arg Ala Glu Ala Pro Cys Tyr Val Ser His Pro Ser Pro Val Pro Pro
    850             855             860

Ser Thr Pro Trp Pro Thr Pro Pro Ala Thr Thr Pro Phe Pro Ala Val
865             870             875             880

Val Gln Pro Tyr Pro Leu Pro Val Phe Ser Pro Arg Gly Gly Pro Gln
            885             890             895

Pro Leu Pro Pro Ala Pro Thr Ser Val Pro Pro Ala Ala Phe Pro Ala
        900             905             910

Pro Leu Val Thr Pro Met Val Ala Leu Val Leu Pro Asn Tyr Leu Phe
        915             920             925

Pro Thr Pro Ser Ser Tyr Pro Tyr Gly Ala Leu Gln Thr Pro Ala Glu
    930             935             940

Gly Pro Pro Thr Pro Ala Ser His Ser Pro Ser Pro Ser Leu Pro Ala
945             950             955             960

Leu Pro Pro Ser Pro Pro His Arg Pro Asp Ser Pro Leu Phe Asn Ser
            965             970             975

Arg Cys Ser Ser Pro Leu Gln Leu Asn Leu Leu Gln Leu Glu Glu Leu
            980             985             990

Pro Arg Ala Glu Gly Ala Ala Val Ala Gly Gly Pro Gly Ser Ser Ala
        995             1000            1005

Gly Pro Pro Pro Pro Ser Ala Glu Ala Ala Glu Pro Glu Ala Arg Leu
    1010            1015            1020

Ala Glu Val Thr Glu Ser Ser Asn Gln Asp Ala Leu Ser Gly Ser Ser
1025            1030            1035            1040

Asp Leu Leu Glu Leu Leu Leu Gln Glu Asp Ser Arg Ser Gly Thr Gly
            1045            1050            1055

Ser Ala Ala Ser Gly Ser Leu Gly Ser Gly Leu Gly Ser Gly Ser Gly
        1060            1065            1070
```

```
Ser Gly Ser His Glu Gly Gly Ser Thr Ser Ala Ser Ile Thr Arg Ser
        1075                1080                1085

Ser Gln Ser Ser His Thr Ser Lys Tyr Phe Gly Ser Ile Asp Ser Ser
        1090                1095                1100

Glu Ala Glu Ala Gly Ala Ala Arg Gly Gly Ala Glu Pro Gly Asp Gln
1105                1110                1115                1120

Val Ile Lys Tyr Val Leu Gln Asp Pro Ile Trp Leu Leu Met Ala Asn
        1125                1130                1135

Ala Asp Gln Arg Val Met Met Thr Tyr Gln Val Pro Ser Arg Asp Met
        1140                1145                1150

Thr Ser Val Leu Lys Gln Asp Arg Glu Arg Leu Arg Ala Met Gln Lys
        1155                1160                1165

Gln Gln Pro Arg Phe Ser Glu Asp Gln Arg Arg Glu Leu Gly Ala Val
        1170                1175                1180

His Ser Trp Val Arg Lys Gly Gln Leu Pro Arg Ala Leu Asp Val Met
1185                1190                1195                1200

Ala Cys Val Asp Cys Gly Ser Ser Thr Gln Asp Pro Gly His Pro Asp
        1205                1210                1215

Asp Pro Leu Phe Ser Glu Leu Asp Gly Leu Gly Leu Glu Pro Met Glu
        1220                1225                1230

Glu Gly Gly Gly Glu Gln Gly Ser Ser Gly Gly Gly Ser Gly Glu Gly
        1235                1240                1245

Glu Gly Cys Glu Glu Ala Gln Gly Gly Ala Lys Ala Ser Ser Ser Gln
        1250                1255                1260

Asp Leu Ala Met Glu Glu Glu Glu Glu Gly Arg Ser Ser Ser Ser Pro
1265                1270                 1275                1280

Ala Leu Pro Thr Ala Gly Asn Cys Thr Ser
        1285                1290
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<211> 1291
<212> PRT
<213> Mus musculus

<400> 2

Met Ser Gly Pro Leu Glu Gly Ala Asp Gly Gly Gly Asp Pro Arg Pro
1                5                10                15

Gly Glu Pro Phe Cys Pro Gly Gly Val Pro Ser Pro Gly Ala Pro Gln
        20                25                30
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His Arg Pro Cys Pro Gly Pro Ser Leu Ala Asp Asp Thr Asp Ala Asn
        35              40                45

Ser Asn Gly Ser Ser Gly Asn Glu Ser Asn Gly Pro Glu Ser Arg Gly
    50              55                60

Ala Ser Gln Arg Ser Ser His Ser Ser Ser Ser Gly Asn Gly Lys Asp
65              70                75                80

Ser Ala Leu Leu Glu Thr Thr Glu Ser Ser Lys Ser Thr Asn Ser Gln
            85                90                95

Ser Pro Ser Pro Pro Ser Ser Ser Ile Ala Tyr Ser Leu Leu Ser Ala
            100             105             110

Ser Ser Glu Gln Asp Asn Pro Ser Thr Ser Gly Cys Ser Ser Glu Gln
        115             120             125

Ser Ala Arg Ala Arg Thr Gln Lys Glu Leu Met Thr Ala Leu Arg Glu
    130             135             140

Leu Lys Leu Arg Leu Pro Pro Glu Arg Arg Gly Lys Gly Arg Ser Gly
145             150             155             160

Thr Leu Ala Thr Leu Gln Tyr Ala Leu Ala Cys Val Lys Gln Val Gln
            165             170             175

Ala Asn Gln Glu Tyr Tyr Gln Gln Trp Ser Leu Glu Glu Gly Glu Pro
        180             185             190

Cys Ala Met Asp Met Ser Thr Tyr Thr Leu Glu Glu Leu Glu His Ile
        195             200             205

Thr Ser Glu Tyr Thr Leu Arg Asn Gln Asp Thr Phe Ser Val Ala Val
    210             215             220

Ser Phe Leu Thr Gly Arg Ile Val Tyr Ile Ser Glu Gln Ala Gly Val
225             230             235             240

Leu Leu Arg Cys Lys Arg Asp Val Phe Arg Gly Ala Arg Phe Ser Glu
            245             250             255

Leu Leu Ala Pro Gln Asp Val Gly Val Phe Tyr Gly Ser Thr Thr Pro
            260             265             270

Ser Arg Leu Pro Thr Trp Gly Thr Gly Thr Ser Ala Gly Ser Gly Leu
    275             280             285

Lys Asp Phe Thr Gln Glu Lys Ser Val Phe Cys Arg Ile Arg Gly Gly
    290             295             300

Pro Asp Arg Asp Pro Gly Pro Arg Tyr Gln Pro Phe Arg Leu Thr Pro
305             310             315             320

Tyr Val Thr Lys Ile Arg Val Ser Asp Gly Ala Pro Ala Gln Pro Cys
            325             330             335
```

Cys Leu Leu Ile Ala Glu Arg Ile His Ser Gly Tyr Glu Ala Pro Arg
        340   345   350

Ile Pro Pro Asp Lys Arg Ile Phe Thr Thr Arg His Thr Pro Ser Cys
        355   360   365

Leu Phe Gln Asp Val Asp Glu Arg Ala Ala Pro Leu Leu Gly Tyr Leu
    370   375   380

Pro Gln Asp Leu Leu Gly Ala Pro Val Leu Leu Phe Leu His Pro Glu
385   390   395   400

Asp Arg Pro Leu Met Leu Ala Ile His Lys Lys Ile Leu Gln Leu Ala
            405   410   415

Gly Gln Pro Phe Asp His Ser Pro Ile Arg Phe Cys Ala Arg Asn Gly
            420   425   430

Glu Tyr Val Thr Met Asp Thr Ser Trp Ala Gly Phe Val His Pro Trp
        435   440   445

Ser Arg Lys Val Ala Phe Val Leu Gly Arg His Lys Val Arg Thr Ala
    450   455   460

Pro Leu Asn Glu Asp Val Phe Thr Pro Pro Ala Pro Ser Pro Ala Pro
465   470   475   480

Ser Leu Asp Ser Asp Ile Gln Glu Leu Ser Glu Gln Ile His Arg Leu
            485   490   495

Leu Leu Gln Pro Val His Ser Ser Ser Pro Thr Gly Leu Cys Gly Val
        500   505   510

Gly Pro Leu Met Ser Pro Gly Pro Leu His Ser Pro Gly Ser Ser Ser
        515   520   525

Asp Ser Asn Gly Gly Asp Ala Glu Gly Pro Gly Pro Pro Ala Pro Val
    530   535   540

Thr Phe Gln Gln Ile Cys Lys Asp Val His Leu Val Lys His Gln Gly
545   550   555   560

Gln Gln Leu Phe Ile Glu Ser Arg Ala Lys Pro Pro Pro Arg Pro Arg
            565   570   575

Leu Leu Ala Thr Gly Thr Phe Lys Ala Lys Val Leu Pro Cys Gln Ser
            580   585   590

Pro Asn Pro Glu Leu Glu Val Ala Pro Val Pro Asp Gln Ala Ser Leu
        595   600   605

Ala Leu Ala Pro Glu Glu Pro Glu Arg Lys Glu Thr Ser Gly Cys Ser
    610   615   620

Tyr Gln Gln Ile Asn Cys Leu Asp Ser Ile Leu Arg Tyr Leu Glu Ser
625   630   635   640

Cys Asn Ile Pro Ser Thr Thr Lys Arg Lys Cys Ala Ser Ser Ser Ser
            645   650   655

Tyr Thr Ala Ser Ser Ala Ser Asp Asp Asp Lys Gln Arg Ala Gly Pro
            660   665   670

Val Pro Val Gly Ala Lys Lys Asp Pro Ser Ser Ala Met Leu Ser Gly
            675   680   685

Glu Gly Ala Thr Pro Arg Lys Glu Pro Val Val Gly Gly Thr Leu Ser
    690   695   700

Pro Leu Ala Leu Ala Asn Lys Ala Glu Ser Val Val Ser Val Thr Ser
705   710   715   720

Gln Cys Ser Phe Ser Ser Thr Ile Val His Val Gly Asp Lys Lys Pro
            725   730   735

Pro Glu Ser Asp Ile Ile Met Met Glu Asp Leu Pro Gly Leu Ala Pro
            740   745   750

Gly Pro Ala Pro Ser Pro Ala Pro Ser Pro Thr Val Ala Pro Asp Pro
            755   760   765

Thr Pro Asp Ala Tyr Arg Pro Val Gly Leu Thr Lys Ala Val Leu Ser
    770   775   780

Leu His Thr Gln Lys Glu Glu Gln Ala Phe Leu Asn Arg Phe Arg Asp
785   790   795   800

Leu Gly Arg Leu Arg Gly Leu Asp Thr Ser Ser Val Ala Pro Ser Ala
            805   810   815

Pro Gly Cys His His Gly Pro Ile Pro Pro Gly Arg Arg His His Cys
            820   825   830

Arg Ser Lys Ala Lys Arg Ser Arg His His His His Gln Thr Pro Arg
            835   840   845

Pro Glu Thr Pro Cys Tyr Val Ser His Pro Ser Pro Val Pro Ser Ser
    850   855   860

Gly Pro Trp Pro Pro Pro Pro Ala Thr Thr Pro Phe Pro Ala Met Val
865   870   875   880

Gln Pro Tyr Pro Leu Pro Val Phe Ser Pro Arg Gly Gly Pro Gln Pro
            885   890   895

Leu Pro Pro Ala Pro Thr Ser Val Ser Pro Ala Thr Phe Pro Ser Pro
            900   905   910

Leu Val Thr Pro Met Val Ala Leu Val Leu Pro Asn Tyr Leu Phe Pro
            915   920   925

Thr Pro Pro Ser Tyr Pro Tyr Gly Val Ser Gln Ala Pro Val Glu Gly
    930   935   940

```
Pro Pro Thr Pro Ala Ser His Ser Pro Ser Pro Ser Leu Pro Pro Pro
945             950             955                 960

Pro Leu Ser Pro Pro His Arg Pro Asp Ser Pro Leu Phe Asn Ser Arg
            965             970             975

Cys Ser Ser Pro Leu Gln Leu Asn Leu Leu Gln Leu Glu Glu Ser Pro
            980             985             990

Arg Thr Glu Gly Gly Ala Ala Ala Gly Gly Pro Gly Ser Ser Ala Gly
        995             1000            1005

Pro Leu Pro Pro Ser Glu Glu Thr Ala Glu Pro Glu Ala Arg Leu Val
    1010            1015            1020

Glu Val Thr Glu Ser Ser Asn Gln Asp Ala Leu Ser Gly Ser Ser Asp
1025            1030            1035            1040

Leu Leu Glu Leu Leu Leu Gln Glu Asp Ser Arg Ser Gly Thr Gly Ser
            1045            1050            1055

Ala Ala Ser Gly Ser Leu Gly Ser Gly Leu Gly Ser Gly Ser Gly Ser
            1060            1065            1070

Gly Ser His Glu Gly Gly Ser Thr Ser Ala Ser Ile Thr Arg Ser Ser
            1075            1080            1085

Gln Ser Ser His Thr Ser Lys Tyr Phe Gly Ser Ile Asp Ser Ser Glu
    1090            1095            1100

Ala Glu Ala Gly Ala Ala Arg Ala Arg Thr Glu Pro Gly Asp Gln Val
1105            1110            1115            1120

Ile Lys Cys Val Leu Gln Asp Pro Ile Trp Leu Leu Met Ala Asn Ala
            1125            1130            1135

Asp Gln Arg Val Met Met Thr Tyr Gln Val Pro Ser Arg Asp Ala Ala
            1140            1145            1150

Ser Val Leu Lys Gln Asp Arg Glu Arg Leu Arg Ala Met Gln Lys Gln
            1155            1160            1165

Gln Pro Arg Phe Ser Glu Asp Gln Arg Arg Glu Leu Gly Ala Val His
    1170            1175            1180

Ser Trp Val Arg Lys Gly Gln Leu Pro Arg Ala Leu Asp Val Met Ala
1185            1190            1195            1200

Cys Val Asp Cys Gly Ser Ser Val Gln Asp Pro Gly His Ser Asp Asp
            1205            1210            1215

Pro Leu Phe Ser Glu Leu Asp Gly Leu Gly Leu Glu Pro Met Glu Glu
            1220            1225            1230

Gly Gly Gly Glu Gly Gly Gly Cys Gly Val Gly Gly Gly Gly Gly Asp
            1235            1240            1245
```

```
Gly Gly Glu Glu Ala Gln Thr Gln Ile Gly Ala Lys Gly Ser Ser Ser
    1250                1255                1260

Gln Asp Ser Ala Met Glu Glu Glu Gln Gly Gly Gly Ser Ser Ser
1265                1270                1275                1280

Pro Ala Leu Pro Ala Glu Glu Asn Ser Thr Ser
                1285                1290
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<210> 3
<211> 3873
<212> DNA
<213> Homo sapiens

<220>
<221> CDS
<222> (1) . . (3873)

<400> 3

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atg agt ggc ccc cta gaa ggg gct gat ggg gga ggg gac ccc agg cct      48
Met Ser Gly Pro Leu Glu Gly Ala Asp Gly Gly Gly Asp Pro Arg Pro
1               5                   10                  15

ggg gaa tca ttt tgt cct ggg ggc gtc cca tcc cct ggg ccc cca cag      96
Gly Glu Ser Phe Cys Pro Gly Gly Val Pro Ser Pro Gly Pro Pro Gln
                20                  25                  30

cac cgg cct tgc cca ggc ccc agc ctg gcc gat gac acc gat gcc aac     144
His Arg Pro Cys Pro Gly Pro Ser Leu Ala Asp Asp Thr Asp Ala Asn
            35                  40                  45

agc aat ggt tca agt ggc aat gag tcc aac ggg cat gag tct aga ggc     192
Ser Asn Gly Ser Ser Gly Asn Glu Ser Asn Gly His Glu Ser Arg Gly
        50                  55                  60

gca tct cag cgg agc tca cac agc tcc tcc tca ggc aac ggc aag gac     240
Ala Ser Gln Arg Ser Ser His Ser Ser Ser Ser Gly Asn Gly Lys Asp
65                  70                  75                  80

tca gcc ctg ctg gag acc act gag agc agc aag agc aca aac tct cag     288
Ser Ala Leu Leu Glu Thr Thr Glu Ser Ser Lys Ser Thr Asn Ser Gln
                85                  90                  95

agc cca tcc cca ccc agc agt tcc att gcc tac agc ctc ctg agt gcc     336
Ser Pro Ser Pro Pro Ser Ser Ser Ile Ala Tyr Ser Leu Leu Ser Ala
                100                 105                 110

agc tca gag cag gac aac ccg tcc acc agt ggc tgc agc agt gaa cag     384
Ser Ser Glu Gln Asp Asn Pro Ser Thr Ser Gly Cys Ser Ser Glu Gln
            115                 120                 125

tca gcc cgg gca agg act cag aag gaa ctc atg aca gca ctt cga gag     432
Ser Ala Arg Ala Arg Thr Gln Lys Glu Leu Met Thr Ala Leu Arg Glu
        130                 135                 140
```

```
ctc aag ctt cga ctg ccg cca gag cgc cgg ggc aag ggc cgc tct ggg    480
Leu Lys Leu Arg Leu Pro Pro Glu Arg Arg Gly Lys Gly Arg Ser Gly
145             150             155             160

acc ctg gcc acg ctg cag tac gca ctg gcc tgt gtc aag cag gtg cag    528
Thr Leu Ala Thr Leu Gln Tyr Ala Leu Ala Cys Val Lys Gln Val Gln
                165             170             175

gcc aac cag gaa tac tac cag cag tgg agc ctg gag gag ggc gag cct    576
Ala Asn Gln Glu Tyr Tyr Gln Gln Trp Ser Leu Glu Glu Gly Glu Pro
                180             185             190

tgc tcc atg gac atg tcc acc tat acc ctg gag gag ctg gag cac atc    624
Cys Ser Met Asp Met Ser Thr Tyr Thr Leu Glu Glu Leu Glu His Ile
            195             200             205

acg tct gag tac aca ctt cag aac cag gat acc ttc tca gtg gct gtc    672
Thr Ser Glu Tyr Thr Leu Gln Asn Gln Asp Thr Phe Ser Val Ala Val
            210             215             220

tcc ttc ctg acg ggc cga atc gtc tac att tcg gag cag gca gcc gtc    720
Ser Phe Leu Thr Gly Arg Ile Val Tyr Ile Ser Glu Gln Ala Ala Val
225             230             235             240

ctg ctg cgt tgc aag cgg gac gtg ttc cgg ggt acc cgc ttc tct gag    768
Leu Leu Arg Cys Lys Arg Asp Val Phe Arg Gly Thr Arg Phe Ser Glu
                245             250             255

ctc ctg gct ccc cag gat gtg gga gtc ttc tat ggt tcc act gct cca    816
Leu Leu Ala Pro Gln Asp Val Gly Val Phe Tyr Gly Ser Thr Ala Pro
                260             265             270

tct cgc ctg ccc acc tgg ggc aca ggg gcc tca gca ggt tca ggc ctc    864
Ser Arg Leu Pro Thr Trp Gly Thr Gly Ala Ser Ala Gly Ser Gly Leu
                275             280             285

agg gac ttt acc cag gag aag tcc gtc ttc tgc cgt atc aga gga ggt    912
Arg Asp Phe Thr Gln Glu Lys Ser Val Phe Cys Arg Ile Arg Gly Gly
                290             295             300

cct gac cgg gat cca ggg cct cgg tac cag cca ttc cgc cta acc ccg    960
Pro Asp Arg Asp Pro Gly Pro Arg Tyr Gln Pro Phe Arg Leu Thr Pro
305             310             315             320

tat gtg acc aag atc cgg gtc tca gat ggg gcc cct gca cag ccg tgc   1008
Tyr Val Thr Lys Ile Arg Val Ser Asp Gly Ala Pro Ala Gln Pro Cys
                325             330             335

tgc ctg ctg att gca gag cgc atc cat tcg ggt tac gaa gct ccc cgg   1056
Cys Leu Leu Ile Ala Glu Arg Ile His Ser Gly Tyr Glu Ala Pro Arg
                340             345             350

ata ccc cct gac aag agg att ttc act acg cgg cac aca ccc agc tgc   1104
Ile Pro Pro Asp Lys Arg Ile Phe Thr Thr Arg His Thr Pro Ser Cys
                355             360             365
```

```
ctc ttc cag gat gtg gat gaa agg gct gcc ccc ctg ctg ggc tac ctg   1152
Leu Phe Gln Asp Val Asp Glu Arg Ala Ala Pro Leu Leu Gly Tyr Leu
    370             375             380

ccc cag gac ctc ctg ggg gcc cca gtg ctc ctg ttc ctg cat cct gag   1200
Pro Gln Asp Leu Leu Gly Ala Pro Val Leu Leu Phe Leu His Pro Glu
385             390             395                 400

gac cga ccc ctc atg ctg gct atc cac aag aag att ctg cag ttg gcg   1248
Asp Arg Pro Leu Met Leu Ala Ile His Lys Lys Ile Leu Gln Leu Ala
            405             410             415

ggc cag ccc ttt gac cac tcc cct atc cgc ttc tgt gcc cgc aac ggg   1296
Gly Gln Pro Phe Asp His Ser Pro Ile Arg Phe Cys Ala Arg Asn Gly
            420             425             430

gag tat gtc acc atg gac acc agc tgg gct ggc ttt gtg cac ccc tgg   1344
Glu Tyr Val Thr Met Asp Thr Ser Trp Ala Gly Phe Val His Pro Trp
            435             440             445

agc cgc aag gta gcc ttc gtg ttg ggc cgc cac aaa gta cgc acg gcc   1392
Ser Arg Lys Val Ala Phe Val Leu Gly Arg His Lys Val Arg Thr Ala
    450             455             460

ccc ctg aat gag gac gtg ttc act ccc ccg gcc ccc agc cca gct ccc   1440
Pro Leu Asn Glu Asp Val Phe Thr Pro Pro Ala Pro Ser Pro Ala Pro
465             470             475             480

tcc ctg gac act gat atc cag gag ctg tca gag cag atc cac cgg ctg   1488
Ser Leu Asp Thr Asp Ile Gln Glu Leu Ser Glu Gln Ile His Arg Leu
            485             490             495

ctg ctg cag ccc gtc cac agc ccc agc ccc acg gga ctc tgt gga gtc   1536
Leu Leu Gln Pro Val His Ser Pro Ser Pro Thr Gly Leu Cys Gly Val
            500             505             510

ggc gcc gtg aca tcc cca ggc cct ctc cac agc cct ggg tcc tcc agt   1584
Gly Ala Val Thr Ser Pro Gly Pro Leu His Ser Pro Gly Ser Ser Ser
            515             520             525

gat agc aac ggg ggt gat gca gag ggg cct ggg cct cct gcg cca gtg   1632
Asp Ser Asn Gly Gly Asp Ala Glu Gly Pro Gly Pro Pro Ala Pro Val
    530             535             540

act ttc cag cag atc tgt aag gat gtg cat ctg gtg aag cac cag ggc   1680
Thr Phe Gln Gln Ile Cys Lys Asp Val His Leu Val Lys His Gln Gly
545             550             555             560

cag cag ctt ttt att gag tct cgg gcc cgg cct cag tcc cgg ccc cgc   1728
Gln Gln Leu Phe Ile Glu Ser Arg Ala Arg Pro Gln Ser Arg Pro Arg
            565             570             575

ctc cct gct aca ggc acg ttc aag gcc aag gcc ctt ccc tgc caa tcc   1776
Leu Pro Ala Thr Gly Thr Phe Lys Ala Lys Ala Leu Pro Cys Gln Ser
            580             585             590
```

```
cca gac cca gag ctg gag gcg ggt tct gct ccc gtc cag gcc cca cta    1824
Pro Asp Pro Glu Leu Glu Ala Gly Ser Ala Pro Val Gln Ala Pro Leu
        595             600             605

gcc ttg gtc cct gag gag gcc gag agg aaa gaa gcc tcc agc tgc tcc    1872
Ala Leu Val Pro Glu Glu Ala Glu Arg Lys Glu Ala Ser Ser Cys Ser
        610             615             620

tac cag cag atc aac tgc ctg gac agc atc ctc agg tac ctg gag agc    1920
Tyr Gln Gln Ile Asn Cys Leu Asp Ser Ile Leu Arg Tyr Leu Glu Ser
625             630             635             640

tgc aac ctc ccc agc acc act aag cgt aaa tgt gcc tcc tcc tcc tcc    1968
Cys Asn Leu Pro Ser Thr Thr Lys Arg Lys Cys Ala Ser Ser Ser Ser
                645             650             655

tat acc acc tcc tca gcc tct gac gac gac agg cag agg aca ggt cca    2016
Tyr Thr Thr Ser Ser Ala Ser Asp Asp Asp Arg Gln Arg Thr Gly Pro
                660             665             670

gtc tct gtg ggg acc aag aaa gat ccg ccg tca gca gcg ctg tct ggg    2064
Val Ser Val Gly Thr Lys Lys Asp Pro Pro Ser Ala Ala Leu Ser Gly
        675             680             685

gag ggg gcc acc cca cgg aag gag cca gtg gtg gga ggc acc ctg agc    2112
Glu Gly Ala Thr Pro Arg Lys Glu Pro Val Val Gly Gly Thr Leu Ser
        690             695             700

ccg ctc gcc ctg gcc aat aag gcg gag agt gtg gtg tcc gtc acc agt    2160
Pro Leu Ala Leu Ala Asn Lys Ala Glu Ser Val Val Ser Val Thr Ser
705             710             715             720

cag tgt agc ttc agc tcc acc atc gtc cat gtg gga gac aag aag ccc    2208
Gln Cys Ser Phe Ser Ser Thr Ile Val His Val Gly Asp Lys Lys Pro
                725             730             735

ccg gag tcg gac atc atc atg atg gag gac ctg cct ggc cta gcc cca    2256
Pro Glu Ser Asp Ile Ile Met Met Glu Asp Leu Pro Gly Leu Ala Pro
                740             745             750

ggc cca gcc ccc agc cca gcc ccc agc ccc aca gta gcc cct gac cca    2304
Gly Pro Ala Pro Ser Pro Ala Pro Ser Pro Thr Val Ala Pro Asp Pro
        755             760             765

gcc cca gac gcc tac cgt cca gtg ggg ctg acc aag gcc gtg ctg tcc    2352
Ala Pro Asp Ala Tyr Arg Pro Val Gly Leu Thr Lys Ala Val Leu Ser
        770             775             780

ctg cac aca cag aag gaa gag caa gcc ttc ctc agc cgc ttc cga gac    2400
Leu His Thr Gln Lys Glu Glu Gln Ala Phe Leu Ser Arg Phe Arg Asp
785             790             795             800

ctg ggc agg ctg cgt gga ctc gac agc tct tcc aca gct ccc tca gcc    2448
Leu Gly Arg Leu Arg Gly Leu Asp Ser Ser Ser Thr Ala Pro Ser Ala
        805             810             815
```

```
ctt ggc gag cga ggc tgc cac cac ggc ccc gca ccc cca agc cgc cga   2496
Leu Gly Glu Arg Gly Cys His His Gly Pro Ala Pro Pro Ser Arg Arg
            820             825                 830

cac cac tgc cga tcc aaa gcc aag cgc tca cgc cac cac cag aac cct   2544
His His Cys Arg Ser Lys Ala Lys Arg Ser Arg His His Gln Asn Pro
            835             840                 845

cgg gct gaa gcg ccc tgc tat gtc tca cac ccc tca ccc gtg cca ccc   2592
Arg Ala Glu Ala Pro Cys Tyr Val Ser His Pro Ser Pro Val Pro Pro
    850             855                 860

tcc acc ccc tgg ccc acc cca cca gcc act acc ccc ttc cca gcg gtt   2640
Ser Thr Pro Trp Pro Thr Pro Pro Ala Thr Thr Pro Phe Pro Ala Val
865             870                 ·875                880

gtc cag ccc tac cct ctc cca gtg ttc tct cct cga gga ggc ccc cag   2688
Val Gln Pro Tyr Pro Leu Pro Val Phe Ser Pro Arg Gly Gly Pro Gln
                885                 890                 895

cct ctt ccc cct gct ccc aca tct gtg ccc cca gct gct ttc ccc gcc   2736
Pro Leu Pro Pro Ala Pro Thr Ser Val Pro Pro Ala Ala Phe Pro Ala
                900                 905                 910

cct ttg gtg acc cca atg gtg gcc ttg gtg ctc cct aac tat ctg ttc   2784
Pro Leu Val Thr Pro Met Val Ala Leu Val Leu Pro Asn Tyr Leu Phe
            915                 920                 925

cca acc cca tcc agc tat cct tat ggg gca ctc cag acc cct gct gaa   2832
Pro Thr Pro Ser Ser Tyr Pro Tyr Gly Ala Leu Gln Thr Pro Ala Glu
    930                 935                 940

ggg cct ccc act cct gcc tcg cac tcc cct tct cca tcc ttg ccc gcc   2880
Gly Pro Pro Thr Pro Ala Ser His Ser Pro Ser Pro Ser Leu Pro Ala
945                 950                 955                 960

ctc ccc ccg agt cct cct cac cgc ccg gac tct cca ctg ttc aac tcg   2928
Leu Pro Pro Ser Pro Pro His Arg Pro Asp Ser Pro Leu Phe Asn Ser
                965                 970                 975

aga tgc agc tct cca ctc cag ctc aat ctg ctg cag ctg gag gag ctc   2976
Arg Cys Ser Ser Pro Leu Gln Leu Asn Leu Leu Gln Leu Glu Glu Leu
                980                 985                 990

ccc cgt gct gag ggg gct gct gtt gca gga ggc cct ggg agc agt gcc   3024
Pro Arg Ala Glu Gly Ala Ala Val Ala Gly Gly Pro Gly Ser Ser Ala
                995                 1000                1005

ggg ccc cca cct ccc agt gcg gag gct gct gag cca gag gcc aga ctg   3072
Gly Pro Pro Pro Pro Ser Ala Glu Ala Ala Glu Pro Glu Ala Arg Leu
    1010                1015                1020

gcg gag gtc act gag tcc tcc aat cag gac gca ctt tcc ggc tcc agt   3120
Ala Glu Val Thr Glu Ser Ser Asn Gln Asp Ala Leu Ser Gly Ser Ser
1025                1030                1035                1040
```

gac ctg ctc gaa ctt ctg ctg caa gag gac tcg cgc tcc ggc aca ggc   3168
Asp Leu Leu Glu Leu Leu Leu Gln Glu Asp Ser Arg Ser Gly Thr Gly
            1045   1050   1055

tcc gca gcc tcg ggc tcc ttg ggc tct ggc ttg ggc tct ggg tct ggt   3216
Ser Ala Ala Ser Gly Ser Leu Gly Ser Gly Leu Gly Ser Gly Ser Gly
            1060   1065   1070

tca ggc tcc cat gaa ggg ggc agc acc tca gcc agc atc act cgc agc   3264
Ser Gly Ser His Glu Gly Gly Ser Thr Ser Ala Ser Ile Thr Arg Ser
            1075   1080   1085

agc cag agc agc cac aca agc aaa tac ttt ggc agc atc gac tct tcc   3312
Ser Gln Ser Ser His Thr Ser Lys Tyr Phe Gly Ser Ile Asp Ser Ser
        1090   1095   1100

gag gct gag gct ggg gct gct cgg ggc ggg gct gag cct ggg gac cag   3360
Glu Ala Glu Ala Gly Ala Ala Arg Gly Gly Ala Glu Pro Gly Asp Gln
1105   1110   1115   1120

gtg att aag tac gtg ctc cag gat ccc att tgg ctg ctc atg gcc aat   3408
Val Ile Lys Tyr Val Leu Gln Asp Pro Ile Trp Leu Leu Met Ala Asn
            1125   1130   1135

gct gac cag cgc gtc atg atg acc tac cag gtg ccc tcc agg gac atg   3456
Ala Asp Gln Arg Val Met Met Thr Tyr Gln Val Pro Ser Arg Asp Met
            1140   1145   1150

acc tct gtg ctg aag cag gat cgg gag cgg ctc cga gcc atg cag aag   3504
Thr Ser Val Leu Lys Gln Asp Arg Glu Arg Leu Arg Ala Met Gln Lys
            1155   1160   1165

cag cag cct cgg ttt tct gag gac cag cgg cgg gaa ctg ggt gct gtg   3552
Gln Gln Pro Arg Phe Ser Glu Asp Gln Arg Arg Glu Leu Gly Ala Val
        1170   1175   1180

cac tcc tgg gtc cgg aag ggc caa ctg cct cgg gct ctt gat gtg atg   3600
His Ser Trp Val Arg Lys Gly Gln Leu Pro Arg Ala Leu Asp Val Met
1185   1190   1195   1200

gcc tgt gtg gac tgt ggg agc agc acc caa gat cct ggt cac cct gat   3648
Ala Cys Val Asp Cys Gly Ser Ser Thr Gln Asp Pro Gly His Pro Asp
            1205   1210   1215

gac cca ctc ttc tca gag ctg gat gga ctg ggg ctg gag ccc atg gaa   3696
Asp Pro Leu Phe Ser Glu Leu Asp Gly Leu Gly Leu Glu Pro Met Glu
            1220   1225   1230

gag ggt gga ggc gag cag ggc agc agc ggt ggc ggc agt ggt gag gga   3744
Glu Gly Gly Gly Glu Gln Gly Ser Ser Gly Gly Gly Ser Gly Glu Gly
            1235   1240   1245

gag ggc tgc gag gag gcc caa ggc ggg gcc aag gct tca agc tct cag   3792
Glu Gly Cys Glu Glu Ala Gln Gly Gly Ala Lys Ala Ser Ser Ser Gln
            1250   1255   1260

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gac ttg gct atg gag gag gag gaa gaa ggc agg agc tca tcc agt cca   3840
Asp Leu Ala Met Glu Glu Glu Glu Glu Gly Arg Ser Ser Ser Ser Pro
1265              1270              1275              1280

gcc tta cct aca gca gga aac tgc acc agc tag                       3873
Ala Leu Pro Thr Ala Gly Asn Cys Thr Ser
              1285              1290
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Met Ser Gly Pro Leu Glu Gly Ala Asp Gly Gly Gly Asp Pro Arg Pro
1              5              10              15

gga gaa cct ttt tgt cct gga gga gtc cca tcc cct ggg gcc ccg cag     96
Gly Glu Pro Phe Cys Pro Gly Gly Val Pro Ser Pro Gly Ala Pro Gln
              20              25              30

cac cgg cct tgt cca ggc ccc agc ctg gct gat gac act gat gca aac   144
His Arg Pro Cys Pro Gly Pro Ser Leu Ala Asp Asp Thr Asp Ala Asn
              35              40              45

agc aat ggc tca agt ggc aat gag tcc aac gga ccc gag tcc agg ggc   192
Ser Asn Gly Ser Ser Gly Asn Glu Ser Asn Gly Pro Glu Ser Arg Gly
       50              55              60

gca tct cag cgg agt tct cat agt tcc tct tct ggc aat ggc aag gac   240
Ala Ser Gln Arg Ser Ser His Ser Ser Ser Ser Gly Asn Gly Lys Asp
65              70              75              80

tca gct ctg ctg gag acc act gag agc agc aag agt aca aac tca cag   288
Ser Ala Leu Leu Glu Thr Thr Glu Ser Ser Lys Ser Thr Asn Ser Gln
              85              90              95

agc cca tcc cca ccc agc agc tcc att gcc tac agc ctc ctg agt gcg   336
Ser Pro Ser Pro Pro Ser Ser Ser Ile Ala Tyr Ser Leu Leu Ser Ala
              100             105             110

agc tca gag cag gac aac cca tct acc agt ggc tgc agc agt gaa cag   384
Ser Ser Glu Gln Asp Asn Pro Ser Thr Ser Gly Cys Ser Ser Glu Gln
       115             120             125

tca gct cga gcc agg acc cag aaa gaa ctc atg act gca ctt cgg gag   432
Ser Ala Arg Ala Arg Thr Gln Lys Glu Leu Met Thr Ala Leu Arg Glu
       130             135             140
```

```
ctc aaa ctt cga ctg cca cca gag cgt cgg ggc aag ggc cgc tct ggg    480
Leu Lys Leu Arg Leu Pro Pro Glu Arg Arg Gly Lys Gly Arg Ser Gly
145             150             155             160

acc ttg gcc aca ctg cag tac gct ctg gcc tgt gtc aag cag gtt cag    528
Thr Leu Ala Thr Leu Gln Tyr Ala Leu Ala Cys Val Lys Gln Val Gln
                165             170             175

gct aac cag gaa tat tac cag cag tgg agt ctg gag gag ggt gag cct    576
Ala Asn Gln Glu Tyr Tyr Gln Gln Trp Ser Leu Glu Glu Gly Glu Pro
            180             185             190

tgt gcc atg gac atg tct act tac acc ctg gag gaa ttg gag cat atc    624
Cys Ala Met Asp Met Ser Thr Tyr Thr Leu Glu Glu Leu Glu His Ile
        195             200             205

aca tcc gaa tac aca ctt cga aac cag gac acc ttc tct gtg gct gtg    672
Thr Ser Glu Tyr Thr Leu Arg Asn Gln Asp Thr Phe Ser Val Ala Val
        210             215             220

tcc ttc ctg aca ggc cgg att gtc tat att tcg gag cag gca ggt gtc    720
Ser Phe Leu Thr Gly Arg Ile Val Tyr Ile Ser Glu Gln Ala Gly Val
225             230             235             240

ctg ctg cgt tgc aaa cgg gat gtg ttt cgg ggt gcc cgc ttc tca gag    768
Leu Leu Arg Cys Lys Arg Asp Val Phe Arg Gly Ala Arg Phe Ser Glu
                245             250             255

ctc ctg gct ccc cag gat gtg ggt gtc ttc tat ggc tct act aca cca    816
Leu Leu Ala Pro Gln Asp Val Gly Val Phe Tyr Gly Ser Thr Thr Pro
            260             265             270

tct cga ctg ccc acc tgg ggc act ggc acc tct gca ggt tca ggt ctc    864
Ser Arg Leu Pro Thr Trp Gly Thr Gly Thr Ser Ala Gly Ser Gly Leu
            275             280             285

aag gac ttc acc cag gaa aag tct gtc ttc tgc cga atc aga gga ggt    912
Lys Asp Phe Thr Gln Glu Lys Ser Val Phe Cys Arg Ile Arg Gly Gly
            290             295             300

cct gac cgg gat cca ggg cct cgg tac cag cca ttc cgc cta acc cca    960
Pro Asp Arg Asp Pro Gly Pro Arg Tyr Gln Pro Phe Arg Leu Thr Pro
305             310             315             320

tat gtg acc aag att cgg gtc tca gat gga gcc cct gca cag ccg tgc   1008
Tyr Val Thr Lys Ile Arg Val Ser Asp Gly Ala Pro Ala Gln Pro Cys
                325             330             335

tgc cta ctc att gcc gag cgc atc cac tct ggt tat gaa gct ccc cgg   1056
Cys Leu Leu Ile Ala Glu Arg Ile His Ser Gly Tyr Glu Ala Pro Arg
            340             345             350

atc cct cct gac aag agg atc ttc acc acc cga cac aca cca agc tgc   1104
Ile Pro Pro Asp Lys Arg Ile Phe Thr Thr Arg His Thr Pro Ser Cys
            355             360             365
```

```
ctc ttc cag gat gta gat gaa agg gct gcc cca ctg ctg ggt tac ctt   1152
Leu Phe Gln Asp Val Asp Glu Arg Ala Ala Pro Leu Leu Gly Tyr Leu
    370             375             380

ccc cag gat ctc ctg ggg gct cca gta ctt ctc ttt cta cat cct gag   1200
Pro Gln Asp Leu Leu Gly Ala Pro Val Leu Leu Phe Leu His Pro Glu
385             390             395             400

gac cga ccc ctc atg ctg gcc att cat aag aag ata ctg cag ctg gca   1248
Asp Arg Pro Leu Met Leu Ala Ile His Lys Lys Ile Leu Gln Leu Ala
            405             410             415

ggc cag ccc ttt gac cat tcc cct att cgc ttc tgt gct cgg aac ggg   1296
Gly Gln Pro Phe Asp His Ser Pro Ile Arg Phe Cys Ala Arg Asn Gly
            420             425             430

gaa tat gtc acc atg gac acc agc tgg gcc ggt ttt gtg cac ccc tgg   1344
Glu Tyr Val Thr Met Asp Thr Ser Trp Ala Gly Phe Val His Pro Trp
            435             440             445

agc cgc aag gtg gct ttc gtg ttg ggt cgc cat aaa gtg cgc acg gca   1392
Ser Arg Lys Val Ala Phe Val Leu Gly Arg His Lys Val Arg Thr Ala
    450             455             460

ccc ctg aat gag gac gtc ttc act ccc cca gcc ccc agc cca gct ccg   1440
Pro Leu Asn Glu Asp Val Phe Thr Pro Pro Ala Pro Ser Pro Ala Pro
465             470             475             480

tcc ctg gac tct gat atc cag gag ctc tca gag cag atc cat cga ttg   1488
Ser Leu Asp Ser Asp Ile Gln Glu Leu Ser Glu Gln Ile His Arg Leu
            485             490             495

ctg ctg cag cct gtg cac agc tcc agc ccc acg ggg ctc tgt gga gtt   1536
Leu Leu Gln Pro Val His Ser Ser Ser Pro Thr Gly Leu Cys Gly Val
            500             505             510

ggc cct ctg atg tcc cct ggt cct cta cac agc cct ggc tcc tcc agt   1584
Gly Pro Leu Met Ser Pro Gly Pro Leu His Ser Pro Gly Ser Ser Ser
            515             520             525

gat agc aat ggg ggg gac gct gag ggg cct ggg cct cct gct cca gtg   1632
Asp Ser Asn Gly Gly Asp Ala Glu Gly Pro Gly Pro Pro Ala Pro Val
    530             535             540

act ttc cag cag atc tgt aag gat gtg cat ctg gta aag cac cag gga   1680
Thr Phe Gln Gln Ile Cys Lys Asp Val His Leu Val Lys His Gln Gly
545             550             555             560

caa cag ctc ttc att gaa tct cgg gcc aag ccc cca ccc cgg ccc cgc   1728
Gln Gln Leu Phe Ile Glu Ser Arg Ala Lys Pro Pro Pro Arg Pro Arg
            565             570             575

ctc ctt gct aca ggt aca ttc aaa gcc aaa gtc ctt ccc tgc cag tcc   1776
Leu Leu Ala Thr Gly Thr Phe Lys Ala Lys Val Leu Pro Cys Gln Ser
    580             585             590
```

```
cca aac ccc gaa ctg gag gtg gcc cca gtt cct gac caa gcc tcg tta   1824
Pro Asn Pro Glu Leu Glu Val Ala Pro Val Pro Asp Gln Ala Ser Leu
        595             600             605

gcc ttg gcc cct gag gag cca gag agg aaa gaa acc tct ggc tgt tcc   1872
Ala Leu Ala Pro Glu Glu Pro Glu Arg Lys Glu Thr Ser Gly Cys Ser
        610             615             620

tac cag cag atc aac tgc ctg gac agc atc ctc agg tat ttg gag agc   1920
Tyr Gln Gln Ile Asn Cys Leu Asp Ser Ile Leu Arg Tyr Leu Glu Ser
625             630             635             640

tgc aac att ccc agt aca acc aag cgt aaa tgt gcc tcc tcc tcc tcc   1968
Cys Asn Ile Pro Ser Thr Thr Lys Arg Lys Cys Ala Ser Ser Ser Ser
                645             650             655

tac act gcc tct tca gcc tct gat gat gac aag cag agg gca ggt cca   2016
Tyr Thr Ala Ser Ser Ala Ser Asp Asp Asp Lys Gln Arg Ala Gly Pro
                660             665             670

gtt cct gtg ggg gcc aag aaa gat ccg tcg tca gca atg ctg tct ggg   2064
Val Pro Val Gly Ala Lys Lys Asp Pro Ser Ser Ala Met Leu Ser Gly
                675             680             685

gag ggg gca act cct cgg aag gag cca gtg gtg gga ggc acc ctg agc   2112
Glu Gly Ala Thr Pro Arg Lys Glu Pro Val Val Gly Gly Thr Leu Ser
        690             695             700

ccg ctc gcc ctg gcc aat aag gca gag agc gtg gtg tcc gtc acc agt   2160
Pro Leu Ala Leu Ala Asn Lys Ala Glu Ser Val Val Ser Val Thr Ser
705             710             715             720

cag tgt agc ttc agc tcc acc atc gtc cat gtg gga gac aag aag ccc   2208
Gln Cys Ser Phe Ser Ser Thr Ile Val His Val Gly Asp Lys Lys Pro
                725             730             735

ccg gag tcg gac atc atc atg atg gaa gac ctg cct ggc ctg gcc cct   2256
Pro Glu Ser Asp Ile Ile Met Met Glu Asp Leu Pro Gly Leu Ala Pro
                740             745             750

ggc cca gcc ccc agt ccg gcc ccc agc ccc aca gta gcc cct gac cca   2304
Gly Pro Ala Pro Ser Pro Ala Pro Ser Pro Thr Val Ala Pro Asp Pro
                755             760             765

acc cca gat gct tat cgc cca gtg ggt ctg acc aag gcc gtg ctg tcc   2352
Thr Pro Asp Ala Tyr Arg Pro Val Gly Leu Thr Lys Ala Val Leu Ser
                770             775             780

ctg cac aca cag aag gaa gag caa gcc ttc ctc aac cgc ttc aga gat   2400
Leu His Thr Gln Lys Glu Glu Gln Ala Phe Leu Asn Arg Phe Arg Asp
785             790             795             800

ctt ggc agg ctt cgt gga ctt gac acc tct tct gtg gcc ccc tca gcc   2448
Leu Gly Arg Leu Arg Gly Leu Asp Thr Ser Ser Val Ala Pro Ser Ala
                805             810             815
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cct ggc tgc cac cat ggc ccc att ccc cct ggt cgc cga cac cac tgc   2496
Pro Gly Cys His His Gly Pro Ile Pro Pro Gly Arg Arg His His Cys
            820                 825                 830

cga tct aaa gca aag cgt tcc cgc cac cac cac cac cag acc ccc cgg   2544
Arg Ser Lys Ala Lys Arg Ser Arg His His His His Gln Thr Pro Arg
            835                 840                 845

ccc gaa act ccc tgc tat gtc tcc cat cct tca cct gtg ccc tct tct   2592
Pro Glu Thr Pro Cys Tyr Val Ser His Pro Ser Pro Val Pro Ser Ser
            850                 855                 860

gga ccc tgg cca ccc cca cca gcc acg acc ccc ttc cca gca atg gtc   2640
Gly Pro Trp Pro Pro Pro Pro Ala Thr Thr Pro Phe Pro Ala Met Val
865                 870                 875                 880

cag ccc tac cca ctc cca gta ttc tcc cct cga gga gga ccc cag ccc   2688
Gln Pro Tyr Pro Leu Pro Val Phe Ser Pro Arg Gly Gly Pro Gln Pro
                885                 890                 895

ctt ccc cct gcc cct aca tct gtg tcc cct gct acc ttc cct tct ccc   2736
Leu Pro Pro Ala Pro Thr Ser Val Ser Pro Ala Thr Phe Pro Ser Pro
                900                 905                 910

tta gtg acc cca atg gtg gcc ttg gtg ctc cct aac tat cta ttc cct   2784
Leu Val Thr Pro Met Val Ala Leu Val Leu Pro Asn Tyr Leu Phe Pro
            915                 920                 925

acc cca cct agt tat cca tat ggg gtg tcc cag gcc cct gtt gag ggg   2832
Thr Pro Pro Ser Tyr Pro Tyr Gly Val Ser Gln Ala Pro Val Glu Gly
    930                 935                 940

cca ccc acg cct gct tcc cac tcg ccc tct cca tcc ctg ccc cca cca   2880
Pro Pro Thr Pro Ala Ser His Ser Pro Ser Pro Ser Leu Pro Pro Pro
945                 950                 955                 960

cct ctc agc ccc ccc cac cgc cca gac tcc cca ctg ttc aac tcg aga   2928
Pro Leu Ser Pro Pro His Arg Pro Asp Ser Pro Leu Phe Asn Ser Arg
                965                 970                 975

tgc agc tcc cca ctc cag ctc aat ctg ctg cag ctt gag gag tcc ccc   2976
Cys Ser Ser Pro Leu Gln Leu Asn Leu Leu Gln Leu Glu Glu Ser Pro
                980                 985                 990

cgc acg gag ggg ggc gct gct gca gga ggc cca gga agc agt gct ggg   3024
Arg Thr Glu Gly Gly Ala Ala Ala Gly Gly Pro Gly Ser Ser Ala Gly
            995                 1000                1005

ccc ctg cct ccc agt gag gag act gct gag cca gag gcc aga ttg gtg   3072
Pro Leu Pro Pro Ser Glu Glu Thr Ala Glu Pro Glu Ala Arg Leu Val
    1010                1015                1020

gag gtt act gag tcg tcc aat cag gat gca ctt tca ggc tcc agc gac   3120
Glu Val Thr Glu Ser Ser Asn Gln Asp Ala Leu Ser Gly Ser Ser Asp
1025                1030                1035                1040
```

```
ctg ctg gag cta ctg ctc caa gaa gac tct cgc tcg ggc aca ggc tcc   3168
Leu Leu Glu Leu Leu Leu Gln Glu Asp Ser Arg Ser Gly Thr Gly Ser
            1045                1050                1055

gca gcc tca ggc tcc ctg ggc tct ggc ctg ggc tct ggg tct ggt tca   3216
Ala Ala Ser Gly Ser Leu Gly Ser Gly Leu Gly Ser Gly Ser Gly Ser
            1060                1065                1070

gga tcc cac gaa ggg gga agc acc tca gcc agc atc acc cgc agc agt   3264
Gly Ser His Glu Gly Gly Ser Thr Ser Ala Ser Ile Thr Arg Ser Ser
            1075                1080                1085

cag agc agc cat aca agc aag tac ttt ggc agc atc gac tct tcc gag   3312
Gln Ser Ser His Thr Ser Lys Tyr Phe Gly Ser Ile Asp Ser Ser Glu
            1090                1095                1100

gct gaa gct ggg gct gct cgg gcc agg act gag cct ggg gac cag gtc   3360
Ala Glu Ala Gly Ala Ala Arg Ala Arg Thr Glu Pro Gly Asp Gln Val
1105                1110                1115                1120

att aag tgt gtg ctc cag gac ccc atc tgg ctg ctc atg gcc aat gcc   3408
Ile Lys Cys Val Leu Gln Asp Pro Ile Trp Leu Leu Met Ala Asn Ala
            1125                1130                1135

gac cag cgt gtc atg atg aca tac cag gtg ccg tcc agg gat gca gcc   3456
Asp Gln Arg Val Met Met Thr Tyr Gln Val Pro Ser Arg Asp Ala Ala
            1140                1145                1150

tct gtg ctg aag caa gac cgg gag agg ctc cgg gcc atg cag aaa cag   3504
Ser Val Leu Lys Gln Asp Arg Glu Arg Leu Arg Ala Met Gln Lys Gln
            1155                1160                1165

cag cca cgg ttc tca gag gac cag agg cgg gaa ctg ggt gct gtg cac   3552
Gln Pro Arg Phe Ser Glu Asp Gln Arg Arg Glu Leu Gly Ala Val His
            1170                1175                1180

tcc tgg gtc cgg aag ggc cag ctg cct cgg gcc ctt gat gtg atg gcg   3600
Ser Trp Val Arg Lys Gly Gln Leu Pro Arg Ala Leu Asp Val Met Ala
1185                1190                1195                1200

tgt gtg gac tgt ggc agc agc gtt caa gat cct ggc cac tct gat gac   3648
Cys Val Asp Cys Gly Ser Ser Val Gln Asp Pro Gly His Ser Asp Asp
            1205                1210                1215

ccg ctc ttc tca gaa ctg gat gga ttg ggg ctg gag ccc atg gaa gag   3696
Pro Leu Phe Ser Glu Leu Asp Gly Leu Gly Leu Glu Pro Met Glu Glu
            1220                1225                1230

ggt gga ggc gag ggt ggt ggg tgt ggt gtt ggc ggc ggt ggg ggt gat   3744
Gly Gly Gly Glu Gly Gly Gly Cys Gly Val Gly Gly Gly Gly Gly Asp
            1235                1240                1245

ggt ggt gag gag gcc cag acc caa att ggg gct aag ggt tca agc tct   3792
Gly Gly Glu Glu Ala Gln Thr Gln Ile Gly Ala Lys Gly Ser Ser Ser
            1250                1255                1260
```

```
cag gac tct gcc atg gag gaa gaa gag caa ggt ggg ggc tca tcc agc   3840
Gln Asp Ser Ala Met Glu Glu Glu Glu Gln Gly Gly Gly Ser Ser Ser
1265             1270             1275             1280


cca gct tta cct gca gaa gaa aac agc acc agc tag                   3876
Pro Ala Leu Pro Ala Glu Glu Asn Ser Thr Ser
            1285             1290
```